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ABSTRACT

The influence of word recognition and conceptual knowledge on readers' comprehension of narrative text has become a fundamental assumption associated with text processing in the primary grades. Features of conceptual knowledge such as prior knowledge, content knowledge, domain knowledge, and discourse knowledge are believed to be significant contributors to reading comprehension in the primary grades. A study examined the relationship among the phases of decoding, the constructs of conceptual knowledge, and metacognitive knowledge to better understand how they contribute to elementary age students' reading comprehension of narrative and expository text. The relationship found within one school district was compared to findings in another, more diverse district. Using Content Based Literacy Assessment (CBLA) instruments developed by each school district, measurement models of word recognition, prior knowledge, content knowledge, domain knowledge, discourse knowledge, strategic knowledge, and reading comprehension for narrative and expository text were developed. While the models developed for each school district did not indicate a high level between the goodness of fit for the two models, important relationships among the components of reading comprehension were recorded. For both school districts, at grades 4 and 5 decoding and word recognition skills indicated strong paths toward reading comprehension; however, the relationship between the paths was different between the districts. Conceptual and metacognitive knowledge also indicated paths to reading comprehension at each of the grade levels with the role of strategic knowledge increasing as grade level increased. (Contains 47 references, and 15 tables and 6 figures of data.) (Author/RS)

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Paper Presentation

A Cross Sectional Comparison of the Relationship Between Decoding Components, Conceptual Knowledge, and Metacognitive Knowledge to Reading Comprehension for Readers in Grades Four and Five

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A cross sectional comparison of the relationship between decoding components, conceptual knowledge, and metacognitive knowledge to reading comprehension for readers in grades four and five.

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Abstract: The influence of word recognition and conceptual knowledge on reader's comprehension of narrative text has become a fundamental assumption associated with text processing in the primary grades. Features of conceptual knowledge such as prior knowledge, content knowledge, domain knowledge, and discourse knowledge are believed to be significant contributors to reading comprehension in the primary grades. Our interest in the present study was to examine the relationship between the phases of decoding, the constructs of conceptual knowledge, and metacognitive knowledge from a broad view to better understand how they contribute to elementary age students' reading comprehension of narrative and expository text. This study also examined the relationship found within one school district and compared these findings with another, more diverse district. Using Content Based Literacy Assessment (CBLA) instruments developed by each school district, measurement models of word recognition, prior knowledge, content knowledge, domain knowledge, discourse knowledge, strategic knowledge and reading comprehension for narrative and expository text were developed. Covariance analysis of linear structural

equations was used to examine the relations among the described variables and cross validation of multiple regression was used to test the confirmatory of fit to the second data set.

Relationships for each data set across the grade levels were reported and compared. While the models developed for each school district did not indicate a high level between the goodness of fit for the two models, important relationships among the components of reading comprehension were recorded. For both school districts, at grades four and five, decoding and word recognition skills indicated strong paths toward reading comprehension, however the relationship between the paths was different between the two districts. Conceptual and metacognitive knowledge also indicated paths to reading comprehension at each of the grade levels with the role of strategic knowledge increasing as grade level increased.
Key words: Word recognition, Conceptual knowledge, Metacognitive knowledge, Comprehension

Introduction

A valuable attribute in our society is the ability to communicate through the use of written text. People who lack the ability to read are severely restricted in their acquisition of knowledge, which becomes most evident when observed in the academic setting where students who lack reading capabilities begin to fail in other areas of academics (Daneman, 1991). Comprehending and understanding what one reads appears to be the highest common denominator for success in academia. Not only does reading

comprehension directly influence learning, but it also has a strong relationship to the development of cognitive skills (Stanovich, 1986). The body of research in reading appears to be in agreement that comprehension is the ultimate purpose of reading (Daneman, 1991; Ehri, 1991; Gough, & Hillinger, 1980; Juel, 1991; Rupley & Willson, 1996; Stanovich, 1991). However, as Rupley and Willson (1996) noted what enables a reader to comprehend text is a complex question which depends largely on the definition of comprehension, the kind of reader, the type of text, and the context in which reading occurs. Early in this century and until the 1960s, reading comprehension was viewed as a progression of hierarchial ordered sub-skills revolving around text access and interpretation. In this scenario once readers had mastered the skills of decoding readers would become experts who comprehended what they read. Research on reading comprehension over the last twenty years led to a reconceptualization that comprehension is an interactive and constructive process (Dole, Duffy, Roehler, & Pearson 1991). According to this cognitive based view of reading comprehension "both novice and expert, use their existing knowledge and a range of clues from the text and the situational context in which reading occurs to build, or construct, a model of meaning from the text" (Dole et al. 1991, p.241). Reading is seen as a process in which the construction of meaning occurs by the interaction of knowledge stored by the reader and the textual information in which the reader encounters. Skilled readers construct mental models of the text by using their existing knowledge along with flexible

strategies. When comprehension breaks down good readers monitor and change strategies so that comprehension has a better chance of occurring. They adjust their strategy selection and their metacognitive awareness based on their level of knowledge specific to that domain (Dole, et. al. 1991).

It appears that embedded within this constructive process are interactive subprocesses, such as phonological recoding, lexical access, syntactic parsing, semantic integration and text organization (Adams 1990). Readers use these processes linked with their access of prior knowledge (Anderson, Reynolds, Schallert, & Goetz 1977; Spilich, Vesonder, Chiesi, & Voss 1979) and strategy knowledge (Alexander & Judy 1988; Alverman, Smith, & Readence, 1985; Jetton, Rupley & Willson, 1995; Rumelhart, 1994) to determine importance, draw inferences, elaborate on text, and monitor comprehension (Dole et al. 1991).

Paris, Wasik, and Turner, (1991) noted as readers reach a level of expertise they use rapid decoding, large vocabularies, phonemic awareness, knowledge about text features, and a variety of strategies to aid comprehension. While novice readers, on the other hand, focus their attention on decoding and fail to adjust their reading styles for different texts and purposes, as well as, fail to monitor their comprehension.

While it is apparent that skilled readers rely on cognitive and strategic knowledge as well as decoding in order to comprehend text it appears that beginning readers must be able to decode the text before they can make associations with information already

stored in memory. There is evidence to support that before a child can learn how to decode the language of print, which is no simple act, he/she must go through several phases or stages of development (Adams, 1990; Chall, 1983; Ehri, 1992; Hoover, & Gough 1990; Juel 1988; Mason, 1980; Stanovich, 1991; Wilson & Rupley, 1993).

Research on the stages of reading acquisition has resulted in several stage models of reading acquisition and although these models are not in complete agreement, there are many similarities. Chall's (1983) stages of reading development advance from stage 0 through 5. Stage 0, which is the prereading stage, coincides with the selective association and logographic or visual cue reading phase identified by Ehri (1992). As students progress through this phase of reading they become frustrated with their inability to detect novel words and begin to realize that the best way to recognize novel words is by associating it with its phonological form.

As students become more oriented with the nature of text and become graphically aware, they realize the failures of the logographic phase and seek new ways to help them break the code of reading. It is up for debate when the child makes this transition. Some researchers believe the acquisition of phonological recoding marks the shift (Frith, 1985; Gough & Hillinger, 1980). While other researchers feel the shift to the next phase occurs when readers learn the shapes, names, or sounds of most alphabet letters and when they acquire low-level phonemic awareness that enables them fo focus on beginning and ending sounds in words (Ehri, 1992,

1991, 1987; Ehri & Wilce, 1987; Tunmer, Herriman, & Nesdale, 1988; Tumner & Hoover, 1992). During this phase the reader is no longer contextually dependent, is able to read a few book words, and has mastered letter names and alphabetic recitation (Ehri, 1987; Mason, 1980). The phonetic cue reader forms access routes out of partial letter-sound correspondence ensuring a more direct route to the lexical recognition of the word. Even though this phase of reading is significantly more advanced than the logographic phase of reading beginners are still limited in the cues they select to recognize words. With this rudimentary knowledge of letter-sounds, that often times only causes the student to focus on the initial and final consonant of the word, the reader realizes that this strategy for solving the code of reading is still inadequate.

The third phase of reading acquisition and word recognition encompasses the latter half of Chall's stage 1. This phase which Biemiller (1970) described as a continued concern with graphic exactness, has been referred to as the cipher phase (Ehri, 1992; Gough & Hillinger, 1980; Juel, 1991 and Mason, 1980). Although the research may disagree about when the cipher or alphabetic phase begins, it is definitely underway when readers can phonologically recode spellings into pronunciations by using grapheme-phoneme correspondence rules. An advantage of phonological recoding over the logographic reading and the phonetic cue reading phase, is that readers have a means for reading unfamiliar words accurately. Another advantage is that it enables readers to read sight words with greater increased accuracy (Ehri, 1991). When beginning

readers gain more complete knowledge about how the alphabetic system symbolizes speech, including knowledge of how diagraphs such as CH, TH, and EA work, as well as how the vowel spelling system works they become more advanced in the alphabetic or cipher phase of reading words (Ehri, 1994, 1991). Phonological recoding is regarded as a central achievement in most theories of reading development. To become a skilled reader the child must give up trying to learn to read each word by memorizing a unique cue for that word. Instead, the reader must master the system where printed words are mapped onto spoken ones. Gough and Hillinger (1980) refer to this phase as cipher reading, which they see as the mastery of the system of rules by which letters and letter sequences map onto phonological forms. During this phase, readers use their phonemic segmentation and phonological recoding skill to form complete connections that secure the entire spelling of the word in memory as a visual symbol for phonemic units in its pronunciation (Ehri, 1992).

When children begin to internalize the cipher, they no longer depend on partial cues of spoken words to solve for unknown words. Instead they perceive the letters of each word and apply the cipher to those letters. These children begin to systematically map visual form onto phonological form, converting a string of letters into a string of phonemes (Gough, Juel, & Griffith, 1992).

Decoding regular and unequivocal words like jump, cat, and spell requires only knowledge of the spelling sound correspondence rules of English. However there are at least two types of words

that cannot be decoded by the cipher alone. Irregular words like Pint, which violate rules, and words that incorporate equivocal letter sequences, in which more than one correspondence rule can be applied like steak (compare head, leak, area, and pineapple) are examples of words that cannot be decoded with cipher alone (Juel, Griffith, & Gough, 1986). This indicates that decoding requires, in addition to the cipher, considerable specific lexical knowledge and contextual knowledge, which enables the reader to apply rules that do and do not belong to particular words.

It appears that phonological awareness, along with letter knowledge, are the strongest predictors of beginning reading achievement, even stronger than intelligence. This evidence suggest that phonological recoding skill is not a mere facilitator, but a necessity for reading words by sight. However, studies of mature readers show that they do not read most words by phonological recoding (Gough, 1984). Skilled readers referred to as orthographic readers, are students who instantly process words into orthographic units or morphemes, without phonological conversions (Frith, 1985).

Orthographic reading begins when children accumulate sufficient knowledge of spelling patterns that recur across words and use this knowledge in reading and in remembering how to read words. Readers accumulate knowledge of the orthographic phase as they phonologically recode different words sharing same patterns, learn to read similarly spelled sight words by storing alphabetic information about the words in memory, and when the reader begins

to recognize letter patterns that reoccur across words. As the reader becomes more aware of these orthographic units, they can create by recombination, an almost unlimited number of words. This strategy is distinguished by the logographic phase by being analytic in a systematic way and by not being dependent on visual cues. It is distinguished from the cipher by operating in bigger units and by being nonphonological (Ehri, 1991; Frith, 1985).

Orthographic knowledge for word reading facilitates the decoding of multisyllabic, unfamiliar words that would be hard to phonemically recode due to the large number of letters needing conversion. It enables readers to set up access routes consisting of spelling patterns that symbolize multiphoneme segments in pronunciation, into memory for reading words by sight. It also speeds up the process of accessing sight words by facilitating letter identification when the letters conform to familiar patterns (Ehri, 1991, 1986; Juel, 1983).

As students gain success at the orthographic phase they reach an automatic stage of word recognition which allows for increased speed in which words can be identified. This fluency in word identification, according to Juel (1991) "allows the child to attend more to meaning, to use contextual information to facilitate the construction of meaning, and to reflect more broadly upon the content that is read" (p.767).

The role of context in word recognition poses a large quantity of the theoretical debates in reading. Models of reading can be partitioned into three categories: the bottom-up, the top-down, and

the interactive (Rumelhart, 1977). Bottom-up models view reading as starting with the printed page and passing in a linear fashion from visual information to meaning through a series of stages (Gough, 1972; LaBerge & Samuels, 1974). The top-down models view reading as starting with the reader's nonvisual information such as experiences, predictions or hypotheses about the upcoming text, and testing these predictions against the printed page (Smith, 1971) Finally the interactive model views reading as the subtle interplay of the conceptual and visual processes (Rumelhart, 1977). All of the theories of reading agree that context plays an important role in reading and to some degree influences word recognition.

The concept of sight reading may imply that there is only one way to read words, however, as the review on the developmental aspects of word recognition has made apparent, there may be several different processes involved depending on the phase of development. At the logographic phase, sight words are read predominantly by associating the word with a visual cue that forms an arbitrary connection route into memory. Students in this phase may also rely heavily on context to make guesses at the unknown word. As children become more aware of print and begin to show mastery of the alphabet, they move into the rudimentary alphabetic phase or the phonetic cue phase of reading development. During this phase the reader uses partial letter-sound cues as well as a heavy reliance on context to form associations to words stored in memory. As students mature in the alphabetic phase they rely on cipher skills to help complete the connection between spellings and the

phonemic structure of words. As students begin to focus on each individual letter to help break the code of word recognition they begin to rely less on context to access the route into memory. To reach the next phase of word reading students must have some degree of mastery at the alphabetic phases before they can successfully use orthographic processing. "Once children become analytic about the spelling of words, they may begin to notice letter patterns that recur across words. The orthographic processing of words may not culminate until after readers have acquired phonological recoding skill and after they have used it to store the spellings of many words with similar patterns in memory." (Ehri, 1991, p.411)

The extant research has demonstrated that there are many theories about how reading acquisition occurs. There are several models of reading that have been designed to summarize the studies and findings of the past, understand the present, and help us make predictions about the future. Models developed by Gough, (1972) and LaBerge & Samuels (1974) concentrated most of the power of their models on word recognition processes. While, Goodman, (1976) and Rumelhart (1994) focus their models around comprehension. Decoding and the ability to recognize words has been shown to be one of the most important features of reading and reading development (Adams, 1990; Chall, 1983; Ehri, 1992; Juel, 1991; Gough and Tunmer, 1986; Stanovich, 1991). However, decoding only makes up one part of the definition of reading and while it seems to play a major role in the beginning stages of reading what happens as students become successful at word recognition and the

emphasis of reading switches from learning to read, to reading to learn. Juel (1988) states that by the end of second grade higher order thinking processes should begin to have more of an impact on reading and that reading comprehension relies on both word recognition skills and higher order thinking skills.

To summarize the information of reading acquisition and the components of knowledge that effect reading comprehension for the present study, it has been shown that research on the models of reading seem to have large gaps in them. Models of reading acquisition do not include the effects of conceptual and metacognitive knowledge while models for skilled readers seem to disregard the paths of beginning readers.

It appears that good readers are students who develop an early awareness of the letters of the alphabet and the sounds that correspond to the letters, use context to help identify unknown words, realize that context alone will not break the code of reading, identify beginning and ending sounds in words, identify all of the sounds in words, learn to organize words into orthographic patterns, develop a large automatic sight vocabulary, realize the purpose of reading, relate new information with knowledge already known, develop and implement content and domain knowledge, monitor their learning, and develop as well as use strategies that promote understanding. Depending on what developmental stage the reader is located determines the amount a reader needs to do in order to be considered a good reader. As the child progresses from one stage of reading to the next, we expect

the child to reach a level of mastery in the ability to decipher the printed language, reach a level of automaticity in word recognition, and begin to implement strategies that enable the reader to continue to gain in the area of comprehension as the purpose of reading changes. It is the hope of this study, to shed some light on the stages of reading and to investigate an interactive model of reading that highlights the important aspects of reading as students progress through grades four and five. Samuels and Kamil (1984) noted that the models of the reading process were partial, they included some sophisticated ideas about reading comprehension, however they failed to include components of prior and metacognitive knowledge. It was their belief, that before a comprehensive model of reading could be developed, that the partial models, already developed should be tested, modified, and studied. As knowledge accumulates after the testing of these models a more comprehensive model can be developed. Alexander and Judy (1988) also recognized the need for investigations into the relationship between content and strategy knowledge. They proposed that techniques such as path and discriminant analysis be used to investigate the relationship between the different components of knowledge.

Following the models developed by Gough (1972), Goodman and Goodman, (1979), LaBerge and Samuels (1974), Rumelhart (1977), and studies by Alexander and Judy (1988), Dole, Duffy, Roehler, and Pearson, (1991), Paris, Lipson, and Wixson, (1994) and Rupley and Willson (1996) the present study can be viewed as an exploratory

study designed to uncover a more inclusive construct of the components of reading comprehension in grades 4 and 5.

The purpose of our study was to investigate the relationship among the components of word recognition, prior knowledge (broadly defined knowledge based on experiences), content knowledge (broadly represented knowledge specific to a given piece of text), domain knowledge (prediction of text content for text similar to text read), discourse knowledge (knowledge of language and textual features), and strategic knowledge (procedural knowledge for understanding what and how text is read), to reading comprehension of narrative and expository text across elementary grades 4 and 5. This study also set out to investigate how a reading model developed for one school district would fit when compared to a more ethnically diverse school district.

We proposed, based on previous word recognition studies, (Adams, 1990; Ehri, 1992; Willson & Rupley, 1993) that by the time students had reached fourth grade, word recognition automaticity had occurred and the feature of word recognition/contextual would begin to indicate a diminished role in narrative and expository comprehension. Since the fourth and fifth grade models reflected the developmental shift of reading and examined both narrative and expository text we proposed that the exogenous variable of strategic knowledge would have direct paths to prior knowledge of narrative text, discourse knowledge of narrative and expository text, and comprehension of narrative and expository text. The endogenous variables of prior knowledge narrative and expository

were believed to be connected with comprehension of narrative and expository text as well as content and domain specific knowledge (See Figure 1).

As students moved into the fifth grade the model's focus began to change and measures of word recognition were deleted. Strategic knowledge became the only exogenous variable in this model and was believed to have paths to all other features of knowledge as well as direct paths to comprehension of expository text. Prior knowledge was only believed to be connected with comprehension of narrative text and comprehension of narrative text was considered to be connected with comprehension of expository text (See Figure 2). The examination of other path models for both the urban and rural school districts grades 4-5 were based on these models.

Method

Subjects: Two samples were studied in this investigation. These school districts were selected due to their interest in developing a reading program based on theoretical models of reading. Random selection was not performed because data from the entire population from each district was used in the analysis. The first sample consisted of 121 fourth graders and 134 fifth graders from an elementary school located in a suburban area of Chicago (predominantly white middle class).

The second school district in this study was from rural Southwest Texas. This sample consisted of 76 fourth graders and 62 fifth graders. The students from this sample were predominantly Hispanic and considered to be from a rural, low socioeconomic area.

Measures: Both school districts were assessed using a Cognitive Based Literacy Assessment (CBLA) instrument developed by district teachers in conjunction with the second author. Each of the school districts developed their own form of assessment. The urban school district developed their assessment instrument with multiple response which differs from most standardized tests, while the rural school district developed their assessment instrument with single response questions. Each school district in grades 4-5 used narrative and expository text selected from the districts list of literary texts available for use by teachers. The items that each school district selected were different; however, they were similar in what they were measuring. Each assessment instrument assessed word recognition capabilities, background, content, domain, discourse, and strategic knowledge of how to read a text and what to read for the selected text. Selection of the questions used to assess word recognition and knowledge measures were made by the teachers based on what they believed was stressed in the instruction at each grade.

The word recognition sections of the CBLA were broken down into measures to coincide with the district's curriculum as well as the research (Adams, 1990; Ehri, 1992; Willson & Rupley, 1993). The subheadings that were created by the school districts are consistent with the terminology used by Ehri (1992) and Juel (1991).

At fourth grade the word recognition section examined features of how students made connections in memory between the entire

sequence of letters in spellings and phonemic constituents in the words pronunciation (Ehri, 1992). At this level students conceptualize the pronunciation as a sequence of phoneme size units, and they analyze the sounds according to conventional phonemic categories rather than according to phonetic criteria. This study followed a more interactive model of reading and did not examine words in isolation, but used context to help in the selection of the unknown word. These subtests were administered on day one and were given prior to the reading comprehension subtest. Subtests that measured word recognition are shown in the following example:

1. He (turned) (turning) the page of the book.

The reading comprehension subtests developed by the second author followed closely standard procedures used to develop such tests. The narrative and expository passages of 1000 to 2000 words (2-4 pages) in length were selected by the school district's list of literary texts. For each text type, comprehension questions (as well as background knowledge and strategic knowledge) were chosen as learning indicators. All comprehension subtests were developed with active participation by teachers at each of the two grade levels and questions were written, tested, and revised to reflect both literal and inferential comprehension. Examples of questions used to assess narrative and expository comprehension following the reading of connected text passages were as follows:

Narrative

1. How do we know that John Henry was a strong person?

a. He drove a spike with just two blows.

b. He swung two twenty pound hammers.

c. He carried two mules across a stream.

d. He beat a machine by drilling the most and deepest holes.

e. He carried three bales of cotton on each of his shoulders.

Expository

1. What are some ways of collecting energy from the sun?

a. Building houses that have windows that face the sun.

b. Using water to hold the sun's heat for later use.

c. Noticing how the earth uses solar energy.

d. Using dark, dull colors to absorb the sun's heat.

e. Going to the beach and drying towels on rocks.

The comprehension subtests for the narrative passages were followed by subtests that were used to measure domain, discourse, and strategic knowledge. Measures of word recognition, prior knowledge, content knowledge, and narrative comprehension were administered on day one, on day two students were administered the domain knowledge, discourse knowledge, and strategic knowledge subtests along with expository comprehension.

Selection of the questions for the knowledge measures was made by the teachers based on what they believed was stressed in the instruction at a grade. The constructs of prior knowledge, content knowledge, and domain knowledge were difficult to separate into

categories. When dividing the questions into several components of conceptual knowledge, much time and deliberation went into the decisions. Prior knowledge questions were very difficult to separate from content knowledge, since the questions were all concerned with the content of the story. It was decided that prior knowledge questions would be the types of questions that dealt with broader concepts that were not necessarily related to the story, while content questions were more specific in nature. Both prior knowledge and content knowledge were assessed prior to reading while domain knowledge was asqessed after reading the story. Examples of each of the various forms of knowledge follow:

Prior Knowledge:

The subtests used to measure prior knowledge were administered prior to the comprehension subtest and were constructed very much like the following example.

You are going to read a story about two good friends who plan a surprise for each other. The two friends are named Frog and Toad. Think about what you already know about friends and surprises that friends would plan for each other. Each sentence below tells about friends and surprises. Read each sentence and circle yes if you think the sentence is about the story; no if you think the statement is not about the story.

1. Good friends like to plan happy surprises for each other.
2. When friends play a nice surprise on each other it makes them feel good.
3. To plan a surprise for a friend means that your friend

can't see you do it.

Content Knowledge

Content knowledge subtests were administered prior to the comprehension subtest. The following passage is an example of a subtest used to measure content knowledge.

Remember that the story you are going to read is about a surprise. Think carefully about surprises and what might happen in a story about a surprise that Toad and Frog plan for each other. Then, read the words listed below and circle yes if you think that the words could be in the story. Circle no if you think that the words should not be in the story.

1.	Frog will never guess.	Yes	No
2.	Toad will play in the street.	Yes	No
3.	Frog and Toad were both happy.	Yes	No

Domain Knowledge

Domain knowledge was assessed after the reading comprehension subtest. Even though domain knowledge is considered a subset of content knowledge and is usually considered as knowledge that is necessary to activate prior to reading; it was used as a post reading activity because the questions were designed to activate knowledge about other texts with similar content and focus the reader's attention on evaluating questions which revolved around the content of the story just read. These questions, which were prior to strategic knowledge questions, were expected to serve as a catalyst for the application of strategic knowledge. Subtests used to measure domain knowledge were constructed like the

following example.

Read the questions below. These questions are based on the story you just read. Circle Yes if the question is one that someone could answer after having read the story "John Henry". Circle No if the question is one that someone could not answer after having read the story "John Henry".

1. Why was John Henry willing to race the steam drilling machine? Yes No

2. How many trains used the tunnel each day? Yes No

3. What did Little Will do? Yes No

Discourse Knowledge

Questions used to represent measures of discourse knowledge were administered after the comprehension subtest and were similar to the following examples.

Suppose after reading the story, "John Henry," you do not understand why John Henry wants to race the machine. How much would it help to:

2.1 reread all of the story starting at the beginning?

a. A lot b. A little c. Not at all

2.2 reread the introduction to the story?

a. A lot b. A little c. Not at all

2.3 reread the part about Captain Tommy and John Henry talking about the race?

a. A lot b. A little c. Not at all

Strategic Knowledge

Strategic knowledge was assessed after the reading comprehension subtest. The following example is a typical form in which the measures of strategic knowledge were obtained.

Which of the following would help you to understand the story, "John Henry?"

a. Knowing what tall tale stories are like.

b. Seeing a movie about how railroad tunnels are made.

c. Building something with a hammer.

d. Reading other stories about John Henry.

e. Having taken a ride on a boat.

Data Analysis

The first step in this study was to use correlational analysis in order to examine the unique relationships among the variables and to determine how the correlated predictors interacted. The next step was to examine whether there was a difference among readers in grades four and five with regard to word recognition/contextual; and prior, content, domain, discourse, and strategic knowledge. In order to explore this question the methodology chosen for this study is based on covariance analysis of linear structural relations, also termed LISREL or structural equation modeling. This methodology represents the most technologically advanced quantitative approach yet developed, including measurement theory, factor analysis, path modeling of underlying factors, and linear modeling of relationships (Willson & Rupley, 1994). Path diagrams are useful representations of presumed models, which show the connections between variables and

underlying assumptions regarding disturbance terms (Linn, 1984). The method has several advantages over other techniques such as regression or ANCOVA in that diagnostic tests or modification indices, are routinely available to assess both free and fixed (usually zero value) relationships and specific ordered relationships are tested. Another reason that analysis of linear structural relations was selected for this study is that the goodness of fit indices are available in abundance to compare models parsimony of fit (Willson & Rupley, 1994).

Measurement models of word recognition/contextual, prior knowledge, content knowledge, domain knowledge, discourse knowledge, and strategic knowledge were developed. The factors were then linked to comprehension at each grade. Previous studies on word recognition (Adams, 1991; Ehri, 1992; Willson & Rupley, 1993) suggested that factors of word recognition would be linked to reading comprehension. The measures used in the analysis of data for word recognition were used in context in order to test an interactive model of reading comprehension rather than a bottom-up view. Word recognition also was assumed to be linked with other latent factors in grades four and was deleted from the model at grade five.

It was also assumed at grades four and five that domain knowledge and content knowledge which are both subsets of prior knowledge, would be linked to themselves as well as linked to comprehension. Prior knowledge which has been defined in this study as the sum of what one knows, will have a strong relationship

to comprehension of narrative text. Strategic knowledge and discourse knowledge should be less directly related at grade four but should increase in relationship as the grades increase (Rupley & Willson, 1996; Willson & Rupley, 1994).

Subjects' scores on the comprehension subtest for narrative and expository comprehension was used as the criterion variable for grades four and five. Word recognition prior, content, domain, discourse, and strategic knowledge, each measured by various subtests, were used as predictor variables.

The second question was addressed by using a form of cross validation of multiple regression. The path models developed with the first school district were used to test the confirmatory of fit to the second data set. It was the belief of this researcher that even though the sample populations of the two school districts differed tremendously and that the CBLA measures also differed to a degree that the models developed for the first school district would have a positive fit with the second data set.

Several models were developed based on interpretations of past models and research. The model developed for fourth grade reflected the developmental shift of reading and examined both narrative and expository comprehension. The features of the exogenous variable word recognition/contextual was believed to have a diminished role, however it was still believed to have paths to narrative and expository text comprehension. Strategic knowledge was considered an exogenous variable which was considered to have direct paths to prior knowledge of narrative text, discourse

knowledge of narrative and expository text and comprehension of narrative and expository text. The endogenous variable of prior knowledge narrative and prior knowledge expository were believed to be connected with comprehension as well as content and domain knowledge (See Figure 1).

The fifth grade model began to focus more on the features of knowledge and no measure of word recognition was used. Strategic knowledge was the only exogenous variable in this model and it was believed to have paths to all of the other features of knowledge as well as a direct path to comprehension of expository text. Prior knowledge was only believed to be connected with comprehension of narrative text and comprehension of narrative text was considered to be connected with comprehension of expository text (See Figure 2).

Results

In order to test the internal consistency among the items of the CBLA, Kuder-Richardson Formula # 20 was used. This method of reliability is based on the consistency of the subjects' responses to all items in the test. Even though the components of word recognition were decided to be placed under one heading in the final analyses, the individual reliabilities for each component are discussed in the following tables. Tables 1-2 illustrate the reliabilities for grades four and five at both school districts.

The next step in this study was to examine the unique relationships among the variables using correlational analysis. Correlational procedures were employed to examine the relationship

between the variables for each of the two grades, at both school districts. The subjects' responses to items designated to represent each of the variables were correlated with responses to other designated variables for each grade level. Correlational matrices for each of the districts' grade levels are presented in the following tables (Tables 3-4).

The half above the leading diagonal in each table illustrates the correlations among the variables for the urban school district, while the half below the leading diagonal in each table represents the correlations for the rural school district. Significant differences between the variables for each school district were tested at $p<.05$. These differences are only compared to the other district, not within the district itself. The correlations examined in this analysis examined the relationship among the individual components of word recognition (phonetic cue/contextual, cipher/contextual, and word recognition) for the urban school district and examined the relationship between the components of phonetic cue/contextual and cipher/contextual as well as combining the items to form one component described as word recognition. The means reported in this analysis reflect multiple responses that were used for several of the items located in each CBLA and not the individual variables created for this study.

In order to assess the effects of word recognition, prior knowledge, content knowledge, domain knowledge, discourse knowledge, and strategic knowledge on narrative and expository text reading comprehension at grades four and five a structural equation

modeling procedure termed PROC CALIS (Sas Institute Inc., 1989) was used. A great deal of statistical output is typically available from the program, so only general trends will be discussed. For all analyses the models were changed based on modification indices for either exogenous variables or latent factor covariances that were statistically significant (either modeled or omitted). For all analyses the fitting continued until the goodness-of-fit index neared or exceeded .90. Bentler and Bonnett's normed fit index better represents the model parsimony achieved and was reported for each analysis. Blind model fitting was not conducted. The theoretical model developed at all grades was tested at .05 (directional), while a probability of .001 was set to change coefficients. Paths that did not meet the .05 criterion were dropped, while omitted paths required .001 significance to be added. Using the model developed for the fourth grade (Figure 1) the effects of word recognition, prior knowledge, content knowledge, domain knowledge, discourse knowledge, and strategic knowledge on narrative and expository text comprehension was examined on the urban group. The results of the analysis are seen in the following Figures and Tables. Table five indicates the goodness of fit associated with the urban fourth grade model based on the extant research.

INSERT TABLE 5

Grade 4 Urban Model

The urban fourth grade model's explanatory power based on the model created by the extant research, is located in Table 5.

According to the analysis of the manifest variable equations it was determined that the paths from prior knowledge expository to prior knowledge narrative and to comprehension expository needed to be dropped. It was also determined that the path from prior knowledge narrative to prior knowledge expository needed to be eliminated as well as the paths from strategic knowledge expository to narrative comprehension and from word recognition/contextual to comprehension expository.

After examining the Lagrange multiplier test and Wald test indices -Gamma- it was decided that paths needed to be added from strategic knowledge narrative to content knowledge expository, from strategic knowledge expository to prior knowledge expository, and from word recognition/contextual to domain knowledge narrative.

Using the Lagrange multiplier test and Wald test indices -Beta- it was determined that paths needed to be included from content knowledge expository to domain knowledge narrative, from domain knowledge narrative to content knowledge expository, from narrative comprehension to content expository, from comprehension expository to prior knowledge expository, from prior knowledge narrative to content knowledge expository, from comprehension narrative to domain knowledge narrative, from comprehension expository to domain knowledge narrative, from discourse expository to discourse narrative and from comprehension expository to content knowledge expository. Based on these recommendations a new model was constructed. The results of the new model can be found in Table 6 as well as in the following descriptions.

INSERT TABLE 6

Upon examination of the manifest variable equations it was determined that the model still needed some corrections. Paths from strategic knowledge narrative to content knowledge narrative needed to be discarded as well as paths from prior knowledge narrative to domain knowledge narrative, from domain knowledge narrative to content knowledge expository, from content expository to comprehension narrative, from prior knowledge expository to comprehension expository, from content expository to comprehension expository and from strategic knowledge narrative to comprehension expository. The Lagrange multiplier test and Wald test indices for Gamma and Beta indicated that no new paths needed to be added. Based on these procedures a third model for fourth grade was completed (Table 7).

Insert Table 7

After viewing the drop in the goodness of fit index and the normed fit index it was determined that explanatory power of the model described in Table 6 was the stronger of the two models. Paths that did not meet the .05 criterion were not included in the description of the final model. (See Figure 3 for further description.

Insert Figure 3

Grade 5 Urban Model

The urban fifth grade model, based on the extant research, indicated a high goodness of fit (Table 8). Even so, the manifest variable equations indicated that paths needed to be discontinued

from: strategic knowledge expository to prior knowledge narrative, strategic knowledge narrative to content knowledge narrative, strategic knowledge expository to content knowledge narrative, prior knowledge narrative to domain knowledge narrative, content knowledge narrative to domain knowledge narrative, strategic knowledge expository to prior knowledge expository, strategic knowledge narrative to content knowledge expository, prior knowledge expository to comprehension expository, strategic knowledge narrative to comprehension expository and strategic knowledge expository to comprehension expository.

Insert Table 8

The Lagrange multiplier test and Wald test indices -Gamma- indicated that a path needed to be included from strategic knowledge narrative to discourse knowledge expository, while the Lagrange multiplier test and Wald test indices -Beta- did not require any new paths be added. Based on these indicators a new model was constructed (See Table 9)

Insert Table 9

After examining the results from the goodness of fit index, a slight drop in the explanatory power of the model was indicated. However, both Bentler an Bonett's non-normed index and normed fit index showed increases in the explanatory power of the model. After much deliberation, a rational decision was made to use the model based on the findings found in Table 8. This model, based on the goodness of fit index, was determined to be a better representation of reading comprehension for the urban fifth grade.

The final model omitted paths that did not make the .05 criterion established to retain paths. For further information regarding the fifth grade model see Figure 4.

Insert Figure 4

Using the Beta weights associated with the corrected models developed for the urban school district, path analysis was conducted in order to compare the model developed for the urban school district with the rural school district. The goodness-of-fit indices, the manifest equation variables, and the Lagrange multipliers, and Wald test indices were then used to determine if the models were similar. After examining these results, models were created to try to best capture the rural groups reading behaviors. In order to do this, new models were created without any of the Beta weights associated with the urban model. Results of the path analyses and descriptions are shown in the following Tables and Figures.

Fourth Grade Urban and Rural Comparison

Using the Beta weights established for the urban fourth grade model, path analysis was used to determine the goodness of fit between the two models (Table 10).

Insert Table 10

Upon examination of the Lagrange multiplier test and Wald test indices -Gamma- and -Beta- it was concluded that paths needed to be constructed between strategic knowledge expository and comprehension expository as well as from narrative comprehension to

discourse knowledge narrative, content knowledge narrative to narrative comprehension, discourse knowledge expository to domain knowledge expository, narrative comprehension to domain knowledge expository, narrative comprehension to content knowledge narrative, content knowledge narrative to discourse knowledge narrative, discourse knowledge narrative to narrative comprehension, and domain knowledge narrative to domain knowledge expository.

In order to construct a reading model which would represent the unique characteristics for the rural fourth grade district, path analysis without beta weights was constructed. The results of the analysis are presented in Table 11.

Insert Table 11

The manifest variable equations suggested that paths from content knowledge expository and strategic knowledge narrative to prior knowledge narrative be discarded. It also determined that paths be dropped from strategic knowledge narrative to content knowledge narrative, prior knowledge narrative and word recognition/contextual to domain knowledge narrative, content knowledge expository to narrative comprehension, domain knowledge narrative and strategic knowledge narrative to content knowledge expository, content knowledge expository and strategic knowledge expository to comprehension expository, and discourse knowledge narrative to discourse knowledge expository.

Using the Lagrange multiplier test and Wald test indices - Beta- it was concluded that paths from narrative comprehension to discourse knowledge narrative, narrative comprehension to content

knowledge narrative, discourse knowledge narrative to comprehension narrative, comprehension expository to content knowledge expository, content knowledge narrative to discourse knowledge narrative and domain knowledge narrative to domain knowledge expository needed to be added.

Based on these findings a new model was constructed. However, when the new information was added, the manifest variable equations indicated that the paths from prior knowledge narrative to content knowledge narrative, strategic knowledge narrative to narrative comprehension and comprehension expository to content knowledge expository needed to be dropped. These suggestions were implemented and the final fourth grade model was completed (Table 12 and Figure 5). Even though some of the paths in this model were determined to be non-significant, when they were dropped from the model, the goodness of fit index decreased and the model was discarded due to its lower explanatory power. The results that helped create Table 12 were used in the final model, however, paths that did not meet the .05 criterion were not included in the completed model.

Insert Table 12

Insert Figure 5.

Fifth Grade Urban and Rural Comparison

Using the Beta weights established for the urban fifth grade model, path analysis was used to determine the goodness of fit between the two models (Table 13).

Insert Table 13

According to the Lagrange multiplier test and Wald test indices -Gamma- the rural fifth grade model would reach a higher goodness of fit, if a path from strategic knowledge expository to discourse knowledge expository was added.

The Lagrange multiplier test and Wald test indices -Beta- also concluded that paths from content knowledge narrative to content knowledge expository, content knowledge expository to content knowledge narrative, narrative comprehension to content knowledge narrative, narrative comprehension to content knowledge expository, discourse knowledge narrative to content knowledge narrative, narrative comprehension to discourse knowledge narrative, content knowledge narrative to discourse knowledge narrative, prior knowledge narrative to discourse knowledge narrative, content knowledge expository to narrative comprehension, and content knowledge narrative to narrative comprehension needed to be included.

In order to determine the unique characteristics of a reading model for the rural fifth grade, path analysis without beta weights was constructed. The results of the analysis are presented in Table 14.

Insert Table 14

According to the manifest variable equations procedure it was determined that the paths from content knowledge narrative and strategic knowledge expository to domain knowledge narrative,

strategic knowledge expository to narrative comprehension, strategic knowledge expository to content knowledge expository, strategic knowledge expository to prior knowledge expository, and narrative comprehension and prior knowledge expository to comprehension expository needed to be deleted. The rest of the paths appeared to be stable. The Lagrange multiplier test and Wald test indices -Gamma- indicated that no new paths needed to be added. The same indices for Beta revealed that paths from content knowledge narrative to content knowledge expository, content knowledge expository to content knowledge narrative, narrative comprehension to content knowledge expository, comprehension narrative to discourse knowledge narrative, prior knowledge narrative to discourse knowledge narrative, discourse knowledge narrative to prior knowledge narrative, narrative comprehension to content knowledge narrative, content knowledge narrative to discourse knowledge narrative, content knowledge expository to narrative comprehension needed to be included. Based upon these recommendations a new model was constructed. Paths that ran in both directions, such as the paths from prior knowledge narrative to discourse knowledge narrative and from discourse knowledge narrative to prior knowledge narrative were tested together and then separately. The paths that had previously indicated arrows going in both directions became only one direction when the paths were added. Many models were tested, but only the one with the highest explanatory power was retained. The model that had the highest explanatory power is described in the following paragraphs.

The new model revealed that the paths from prior knowledge narrative to content knowledge narrative, strategic knowledge narrative to content knowledge narrative, strategic knowledge narrative to discourse knowledge narrative, content knowledge expository to discourse knowledge narrative, narrative comprehension to discourse knowledge narrative, prior knowledge expository to content knowledge expository, and strategic knowledge narrative to content knowledge expository needed to be eliminated. The new analysis also revealed that it was not necessary to add any new paths (Table 15). Based on this analysis a new model was developed.

Insert Table 15

When the model was run without the paths recommended in the analysis which helped create Table 15, the new model indicated that statistically, no paths needed to be dropped or added, however the new model dropped in explanatory power as indicated by the goodness of fit index. Based on this finding it was decided that the new model for the rural grade five would be developed using the information found in Table 15. However, paths that did not meet the .05 criterion were not included in the final illustration of the model. See Figure 6 for the final results.

Insert Figure 6

Discussion

The primary purpose of this research was to explore the construct of reading comprehension from a developmental perspective and attempt to sort out the relationship between the components of

word recognition and features of conceptual and strategic knowledge contributing to comprehension at grades four and five. A number of conclusions can be drawn from the results of this study.

Using the Kuder-Richardson Formula #20 the reliability among the items was tested. Tables 1-2 present the results of the reliabilities. For fourth grade most of the items indicate a reliability measure between .60 and .94. However, several reliability measures fall considerably below the .60 range. The Urban CBLA presents results for word recognition .34, content knowledge .26 and prior knowledge narrative .35, for domain knowledge narrative .57, for strategic knowledge narrative .49, for discourse knowledge narrative .21, for prior knowledge expository .29, for content knowledge expository .40, for comprehension expository .58 and for discourse knowledge expository .15. The rural assessment measure for fourth grade also indicates low reliabilities for word recognition .51, content knowledge narrative .36, prior knowledge narrative .27, domain knowledge narrative .55, strategic knowledge narrative .45, discourse knowledge narrative .35, content knowledge expository .49, strategic knowledge expository .08 and discourse knowledge expository .51.

The fifth grade also indicated low reliabilities in many of the same measures. For the urban fifth grade reliabilities are found of .23 for content knowledge narrative, .34 for prior knowledge narrative, .49 for domain knowledge narrative, .47 for strategic knowledge narrative, .17 for discourse knowledge narrative, .17 for prior knowledge expository, .35 for content

knowledge expository, .38 for comprehension expository, .07 for strategic knowledge expository and .38 for discourse knowledge expository. The rural CBLA for the fifth grade also indicated low reliabilities of .29 for prior knowledge narrative, .04 for domain knowledge narrative, .39 for strategic knowledge narrative, .45 for discourse knowledge narrative, .15 for prior knowledge expository, .54 for comprehension expository, .57 for domain knowledge expository, .54 for strategic knowledge expository and .43 for discourse knowledge expository.

The information gained from the investigation of internal reliabilities has indicated a large number of the reliabilities for this study fall below the .60 range. The implications of these low reliabilities suggest that paths found in regards to the structural equation models are limited in the relationship that they can find, due to the low reliabilities of the measures. The paths still exist, however they are limited in the degree of relationship they can show to the square root of the reliabilities for the measures.

Correlations examining relationships among variables indicated that there were some significant differences at .05 level for several variables for each school district. These correlations show the unique relationships among the variables. The significant differences among the unique relationships for the variables indicate areas that may show differences between the path models. When examining the unique correlational relationships among the variables one notices that there is a significant difference between the two districts. This could be due to the fact that the

rural district is made up of a large Hispanic population and that features of word recognition have a larger feature on reading comprehension than they do for the urban group, which comes from a population that is from a higher socioeconomic bracket and a largely English speaking background. This may indicate why there is a difference between the two models for each district.

During the primary grades components of word recognition, prior knowledge, and strategic knowledge are considered to have an effect on reading comprehension, but to what degree is still unsettled. The extant research had demonstrated that at grade 3, students began to show a shift in the effects of the components of reading comprehension. Word recognition, which is always important to reading, has shown to have a diminishing effect on comprehension because the majority of the students had reached a level of mastery in the area of decoding. Since most students reach a level of mastery in decoding as they progress through the grades the effects on reading comprehension are less noticeable and do not demonstrate the same ability to distinguish good comprehenders from poor ones. However, word recognition, still demonstrates the largest contribution to reading comprehension at third grade even though components of conceptual and metacognitive knowledge begin to show stronger relationships to reading comprehension. As students progress through the grades and reading switches its emphasis from learning to read to reading to learn and the components of knowledge begin to increase in importance. The role of features of knowledge in reading comprehension becomes more noticeable. Since

reading is viewed as a tool for learning, being able to associate the text with experiential knowledge, whether it be broad world knowledge, knowledge that becomes more specific to a content area, or knowledge relevant to a specific domain begins to show stronger effects on reading comprehension. Just as conceptual knowledge begins to surface as a contributor to reading comprehension, strategic knowledge, the ability to monitor one's comprehension and adjust for various reading purposes, also begins to show stronger relationships to comprehension as well as discourse knowledge which revolves around an understanding of the language and text types.

The urban fourth grade model's goodness of fit index was .83 when compared to the theoretical model. After testing the corrections based on the original model's data, the goodness of fit index reached a level of .93. While other paths were suggested to be dropped and others added, this model proved to have the highest goodness of fit.

The fourth grade urban model represents the developmental shift associated with content area reading and narrative text with more complex plots. Features of word recognition still had a path to narrative comprehension, but the significance of the path had dropped. Word recognition also had a path to domain knowledge and domain knowledge had a path to narrative comprehension. Prior knowledge as well as strategic knowledge, also had paths leading to narrative comprehension. Strategic knowledge narrative also had direct paths to prior knowledge narrative, discourse knowledge narrative, as well as, content knowledge expository. The only path

that went directly to comprehension expository was strategic knowledge expository. Domain knowledge of narrative text also had a path to comprehension expository, however domain knowledge narrative was made up of paths from content knowledge expository and word recognition. As students move into content area reading, strategic knowledge seems to be the number one factor in reading comprehension. Strategic knowledge also influences the conceptual knowledge features as well as discourse knowledge.

Paris, Lipson, and Wixson (1994) discussed this phenomenon in reading. According to their research all of the components of reading are influenced by strategic knowledge. Even decoding is considered to be influenced by low level strategic knowledge. As children become better readers and learn to read, the more strategic they become. Through practice and instruction children become enlightened that reading is a cognitive, perceptual, and social activity. Through this understanding readers realize that comprehension is the goal of reading and they begin to employ strategies to enable comprehension. Unfortunately many young students never learn how to employ strategies for comprehension.

Alexander and Judy (1988) also examined the relationship between metacognitive and conceptual knowledge as they examined the interaction between domain-specific knowledge and strategic knowledge. According to their research the less a student knows about content relative to the task the more strategic knowledge they use to aid in comprehension. As texts and story lines in fourth grade become more complex the prior knowledge which students

had, may have been inadequate. If their background knowledge was limited the more they would rely on strategic knowledge to help monitor comprehension.

The fifth grade also had a high goodness of fit index with the theoretical model. The goodness of fit between the theoretical model and the urban fifth grade was .92. Even though paths were recommended to be dropped and others added, this model, based on theory had the highest goodness of fit. This model, much like the fourth grade model, indicated that comprehension of narrative text was influenced by strategic knowledge narrative and also by prior knowledge narrative. Once again this can be attributed to the relationship between strategic knowledge and the other components of reading comprehension. If students lack conceptual knowledge about a particular subject they rely more heavily on monitoring strategies to enable comprehension. Strategic knowledge narrative also had direct paths to prior knowledge narrative, domain knowledge narrative, prior knowledge expository, and discourse knowledge narrative. Comprehension expository had paths from comprehension narrative and strategic knowledge expository. Strategic knowledge expository also had direct paths to content knowledge expository and discourse knowledge expository. Once again strategic knowledge is the number one factor for comprehension in the urban fifth grade.

Dole, Duffy, Roehler, & Pearson (1991) as well as Paris, Wasik, and Turner (1991) have argued that reading is a complex interaction between decoding, conceptual, and metacognitive

knowledge. The results of the fourth and fifth grade path analysis support their findings. Fourth grade marks the passage into Chall's stage three of reading development and also the developmental shift into content area reading. The results in this study indicate that features of word recognition still have a direct path to narrative reading comprehension, however the path begins to drop in significance. At fourth grade, features of conceptual and metacognitive knowledge begin to show direct effects on reading comprehension. Comprehension of narrative text is directly influenced by strategic knowledge narrative and also by prior and domain knowledge narrative. However, the paths from prior knowledge and domain knowledge are affected by strategic knowledge and word recognition. Comprehension of expository text is directly affected by strategic knowledge expository and also by domain knowledge narrative which is affected by a series of paths leading from strategic knowledge expository, prior knowledge expository, and content knowledge expository.

Fifth grade comprehension also indicates more of the findings associated with fourth grade. Narrative comprehension consists of direct paths from strategic knowledge narrative and strategic knowledge expository, as well as a path from prior knowledge narrative which is influenced by strategic knowledge narrative. Comprehension expository also has a direct path from strategic knowledge expository as well as a path from comprehension narrative which is influenced by prior knowledge narrative, strategic knowledge narrative, and strategic knowledge expository. The

results support research conducted by Paris, Lipson, and Wixson (1994) and Alexander and Judy (1988) that strategic knowledge is highly important to the act of comprehension, especially as the reading process becomes more difficult and the material becomes more complex. Readers who lack the conceptual knowledge to understand more sophisticated text rely more heavily on strategic knowledge to aid in comprehension.

As readers advance through the grades, reading comprehension becomes a more complex process which is influenced not only by word recognition abilities, but also features of conceptual and metacognitive knowledge. However, this study did not find support for theories, such as schema theory (Anderson & Pearson, 1984), which have postulated a central role for prior knowledge in reading. Instead, this study indicated that while prior knowledge did have a role in comprehension it was influenced by strategic knowledge.

When comparing the rural fourth grade model using the beta weights associated with the urban model it produced a goodness of fit index of .83. Using the corrections suggested by the model a new model was developed without using the beta weights associated with the urban model. This new model had a goodness of fit index of .92. This model had direct paths from word recognition and narrative prior knowledge to narrative comprehension. There was also a path leading to narrative comprehension from narrative discourse knowledge, which was affected by paths leading from narrative strategic knowledge and narrative content knowledge.

Another path leading to narrative comprehension came from expository domain knowledge, which was affected by a path leading from expository content knowledge. Expository comprehension had a direct path from narrative strategic knowledge as well as narrative domain knowledge which was strongly affected by narrative comprehension. For the rural fourth grade as the students made the switch into reading to learn and began to use expository text the variables that had the strongest influence on expository comprehension were strategies developed for monitoring narrative comprehension and the effects of narrative comprehension as they interacted through specific domain knowledge associated with narrative text. Due to these students' lack of experience with expository text, they used strategies implemented for comprehension of narrative text and appeared to apply this knowledge to the comprehension of expository text. Due to the possibility of this sample's limited English background and average to low socioeconomic background, it has been assumed that these students had limited exposure to a large variety of text. Thus, it is believed that these students may have used strategies associated with narrative texts to help comprehend expository text.

The fourth grade narrative comprehension for the rural school district was very much like the urban school district except the features of word recognition demonstrated a larger role in comprehension than word recognition features associated with the urban group. Strategic knowledge also interacted with comprehension through discourse knowledge which played a larger

factor on reading comprehension for the rural sample than the urban sample. Expository Comprehension was influenced more by strategies for narrative text and domain specific knowledge for narrative than features of conceptual and metacognitive knowledge for expository text.

The rural fifth grade model based on the beta weights found in the urban model provided a goodness of fit index of .58. Using the Lagrange multiplier and Wald test indices a new model was developed without using the beta weights for the urban fifth grade. After several runs of the model, a final model was developed for the rural fifth grade which reached a goodness of fit index of .91. This new model was very complex. The only features that were independent of the others were, narrative strategic knowledge and expository strategic knowledge. Narrative strategic knowledge had a direct path to both narrative comprehension and expository comprehension. Narrative strategic knowledge had another path to narrative comprehension through narrative prior knowledge. Narrative strategic knowledge also had paths to narrative domain knowledge, and expository prior knowledge. Expository strategic knowledge had direct paths to expository comprehension as well as narrative prior knowledge and narrative content knowledge. One noticeable finding in the rural fifth grade model was the relationship of narrative comprehension to narrative content knowledge and expository content knowledge. The relationship was opposite of what was expected. Narrative comprehension had paths directly leading to the components of knowledge rather than the

other way around. One way to account for this phenomenon is that narrative comprehension in itself activated the components of knowledge. Since reading is an interactive model, not only do features of knowledge and word recognition have an effect on comprehension, but comprehension also has an effect on their role. Reading is a give and take process and each component depends on the other to bring about understanding. As students become better at comprehension, the skills necessary to comprehend, also become interacted with the features of knowledge, whether it is for narrative text or expository. Even though the components of conceptual knowledge did not interact as expected, the main contributors to comprehension for the rural fifth grade were the same as the ones found for the urban fifth grade. Comprehension for both narrative and expository text are mainly influenced by strategic and prior knowledge.

The fourth grade models represent the developmental shift in reading and become more complex than path models associated with earlier grades. Components of knowledge for both narrative and expository text began to interact with each other and the models reflect these complex interactions. Features of word recognition still had direct paths to comprehension for both grades sampled and also domain knowledge for the urban sample; however, its relationship to the other components of knowledge no longer indicated a significant relationship.

Word recognition still indicated a stronger relationship to comprehension for the rural school district than the urban school

district. This difference is attributed to the differences in the two populations. The models also show several other differences between the two sample groups especially when examining the relationship between the components of conceptual and metacognitive knowledge. Narrative strategic knowledge had a direct path to narrative comprehension for the urban group, but passed through discourse knowledge before it went to comprehension for the rural group. Narrative strategic knowledge also had a path to narrative prior knowledge and expository content knowledge for the urban group and a direct path to expository comprehension for the rural group. These differences are difficult to account for. It is difficult to say why strategic knowledge for narrative text has a direct path to expository comprehension and to expository content knowledge. It is believed by this researcher that strategic knowledge may be a global measure and not specific to narrative or expository text. If a student is able to monitor comprehension for narrative text, these same monitoring skills would be similar to the ones used to monitor expository comprehension. These similarities may account for the interaction between the two different types of text.

Prior knowledge for each of the two models also had paths leading to comprehension. A path from prior knowledge to content knowledge was also found in the urban group, but not in the rural group. Domain knowledge also had some interesting interactions for each of the two models. The urban model indicated that domain knowledge is predicted by paths leading from strategic knowledge

expository to prior knowledge expository, prior knowledge expository to content knowledge expository and finally from content knowledge expository to domain knowledge narrative. There was also a path leading from word recognition to domain knowledge narrative. Domain knowledge narrative then led to both narrative and expository comprehension. Domain knowledge was measured after the reading comprehension section and reflected information that is specific to the text read. It is difficult to say why so many of the expository features interacted with specific information related to narrative text. Domain knowledge narrative also had some interesting interactions for the rural model. Domain knowledge narrative consisted of one extremely significant path from narrative comprehension. Domain knowledge narrative then had paths leading to comprehension expository and content knowledge expository. Domain knowledge expository which was only measured with the rural group had a direct path leading to narrative text comprehension, but not to expository comprehension. Prior knowledge appears to be very difficult to factor out. While it does seem to have an effect on comprehension it does not seem to follow the hierarchy reflected in the extant literature and does not appear to be related specifically to narrative or expository comprehension. Being able to apply prior knowledge appears to be a more important feature than specific information related to the text at hand.

The fifth grade models continue to display the complexity of comprehension and the interactions between conceptual and

metacognitive knowledge. Even though the complexity of the models increase, there are still several similarities that exist between the two models. For each of the models, narrative comprehension consisted of paths leading from narrative strategic knowledge and narrative prior knowledge. Both models also revealed paths running from narrative strategic knowledge to narrative prior and narrative domain knowledge, as well at to expository prior knowledge. Another similarity among the two models was that narrative content knowledge consisted of a path leading from narrative prior knowledge. The differences between the two models was demonstrated by the various interactions between the features of knowledge for the rural group. For the rural group, narrative comprehension had paths leading to narrative content knowledge and expository content knowledge. The rural model also revealed paths running from narrative prior knowledge to narrative domain and narrative discourse knowledge. Narrative content knowledge also had a path running to expository content knowledge and while the rural sample had a path from narrative strategic knowledge to expository comprehension, the urban sample had a path running from expository strategic knowledge to narrative comprehension.

Upon examination of expository comprehension for the fifth grade, the two models show that expository strategic knowledge had paths running to expository comprehension. It also revealed that for the urban group there was a path leading from narrative comprehension to expository comprehension and for the rural group there was a path leading form narrative strategic knowledge to

expository comprehension.

Once again, as found in the fourth grade data, strategic knowledge seemed to be the most consistent feature of comprehension for both narrative and expository text and that strategic knowledge used for narrative text can also help monitor comprehension of expository text. It also appears to reveal that while conceptual knowledge does have paths leading to narrative comprehension, these paths are influenced by strategic knowledge and that comprehension of expository text does not show a relationship between the components of conceptual knowledge. At first glance these findings seem to contradict the importance of prior, content, and domain knowledge in the content areas. However, this researcher feels that just the opposite is true. These data indicate that students do not use the conceptual features of knowledge to help assist comprehension using expository text, but do use it in comprehending narrative text. Literature-based classrooms emphasize the importance of prior knowledge and often use prereading activities to help motivate students to read narrative passages and help students make the connections between their experiences and the text. Students receive instruction on how to read narrative texts and part of this instruction emphasizes the importance of using the components of conceptual knowledge. However many researchers have concluded that students moving into content area reading do not receive instruction on how to read these types of text. Being able to use conceptual knowledge for comprehending expository text is not the same as using it for narrative text. The purpose of

reading as well as the style of reading becomes vastly different. This may be one of the reasons why expository comprehension does not indicate a relationship between features of conceptual knowledge.

Strategic knowledge, on the other hand, does show up as a major contributor to both narrative and expository comprehension. As Paris, Lipson, and Wixson (1994) have previously indicated, all aspects of reading are influenced by the strategies readers use to monitor their abilities and understanding. According to their research students use strategies to monitor aspects of word recognition, usage of conceptual knowledge, and comprehension. According to Alexander and Judy (1988) students who lack conceptual knowledge about a topic rely more on strategic knowledge to aid in understanding. If a reader is reading about a topic that they have little prior knowledge for they must constantly check for comprehension, and adjust strategies for understanding, such as rereading, asking self-questions, and organizing the information. On the other hand, if a student has a large amount of prior knowledge about a topic they do not have to access strategies as often, because comprehension of the subject is already available to the reader. Strategies for reading are also not as specific to text type as features of conceptual knowledge. The strategies which one uses to monitor comprehension of narrative text can be applied to expository text comprehension and vice-versa. The analysis conducted in this study appear to indicate this train of thought. Strategic narrative knowledge often revealed paths to

narrative comprehension, while strategic expository knowledge revealed paths to narrative comprehension. Monitoring comprehension extends across text type.

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Figure 1 Fourth grade reading model

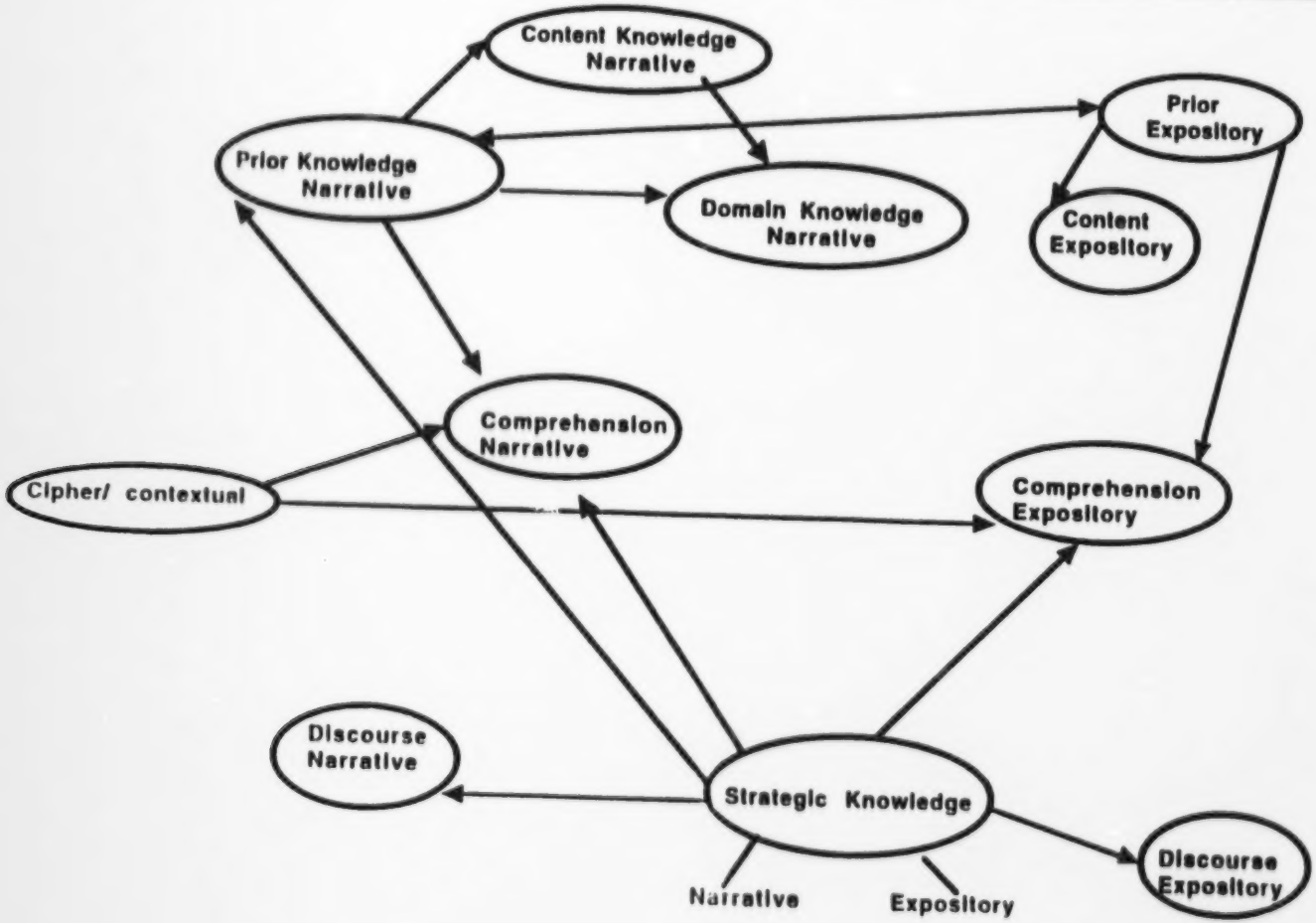

Figure 2 Fifth grade reading model

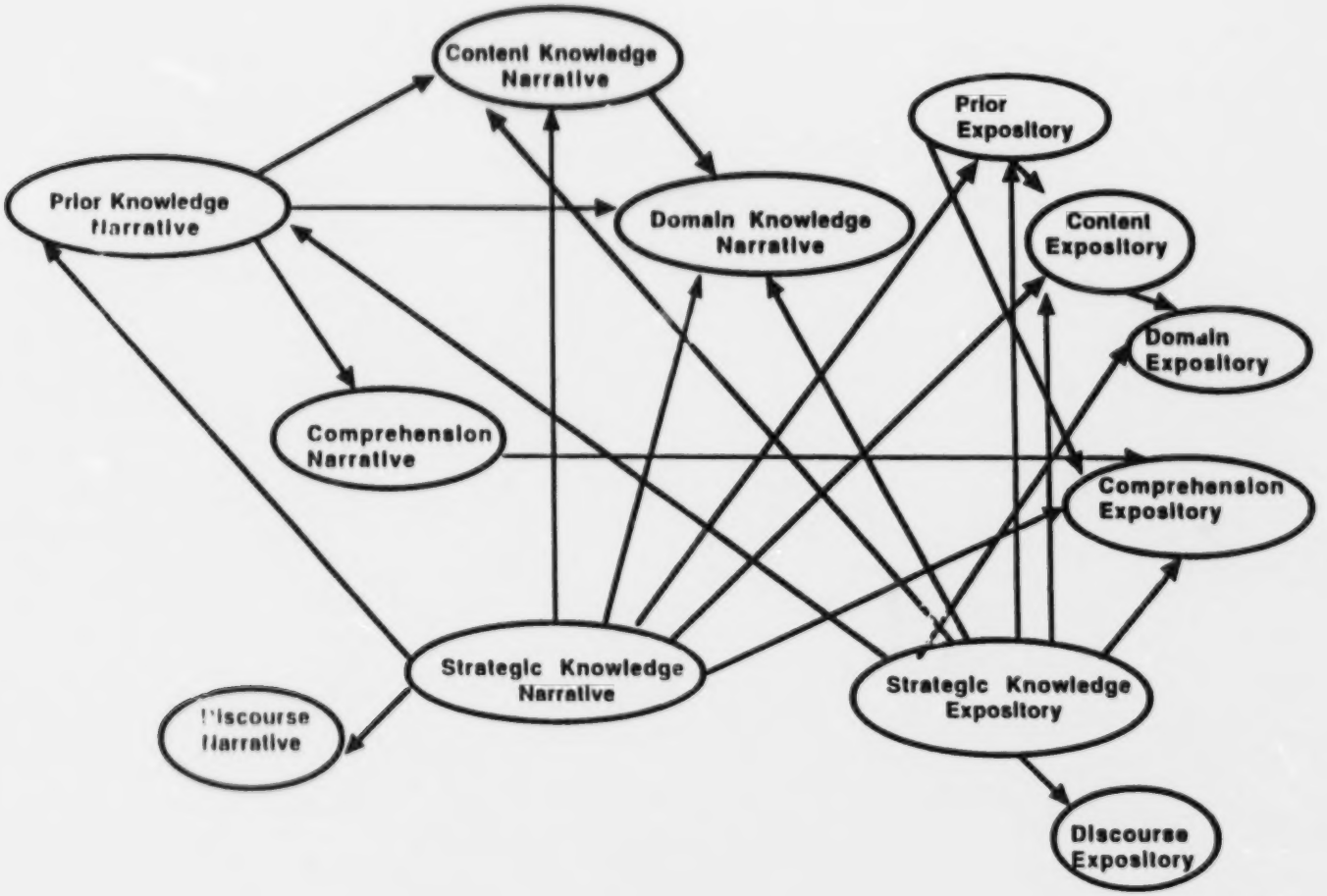

Table 1 Reliability coefficients based on individual components and items for grade 4

	Grade 4 Urban		Grade 4 Rural		
	α	N of items		α	N of items
Cipher	0.34	5	Cipher	0.51	10
Cont. Kn.	0.26	5	Cont. Kn.	0.36	15
Prior Kn.	0.35	5	Prior Kn.	0.27	10
Comp. Narr.	0.71	5	Comp. Narr.	0.80	25
Dom. Kn.	0.57	10	Dom. Kn.	0.55	15
Strat. Kn.	0.49	6	Strat. Kn.	0.45	5
Disc. Kn.	0.21	6	Disc. Kn.	0.35	14
Prior Ex.	0.29	5	Prior Ex.	- - - -	- -
Cont. Ex.	0.40	5	Cont. Ex.	0.49	15
Comp. Ex.	0.58	5	Comp. Ex.	0.78	10
Dom. Ex.	- - - -	- -	Dom. Ex.	0.67	10
Strat. Ex.	0.61	5	Strat. Ex.	0.08	5
Disc. Ex.	0.15	9	Disc. Ex.	0.51	15

Table 2 Reliability coefficients based on individual items and components for grade 5

	Grade 5 Urban		Grade 5 Rural		
	α	N of items		α	N of items
Cont. Kn.	0.23	5	Cont. Kn.	0.64	20
Prior Kn.	0.34	5	Prior Kn.	0.29	5
Comp. Narr.	0.74	5	Comp. Narr.	0.78	25
Dom. Kn.	0.49	10	Dom. Kn.	0.04	10
Strat. Kn.	0.47	8	Strat. Kn.	0.39	5
Disc. Kn.	0.17	10	Disc. Kn.	0.45	18

Table 2 Reliability coefficients cont.

	Grade 5 Urban			Grade 5 Rural	
	α	N of items		α	N of items
Prior Ex.	0.17	5	Prior Ex.	0.15	5
Cont. Ex.	0.35	3	Cont. Ex.	0.66	15
Comp. Ex.	0.38	5	Comp. Ex.	0.54	5
Dom. Ex.	- - - -	- -	Dom. Ex.	0.57	10
Strat. Ex.	0.07	4	Strat. Ex.	0.54	9
Disc. Ex.	0.38	10	Disc. Ex.	0.43	8

Table 5 Fourth grade original model

Covariance structure analysis: maximum likelihood estimation	
Goodness of fit index	0.8298
Bentler & Bonett's non-normed index	0.6507
Bentler & Bonett's NFI	0.6998

Table 6 Fourth grade model based on corrections

Covariance structure analysis: Maximum likelihood estimation	
Goodness of fit index	0.9314
Bentler & Bonett's non-normed index	0.9380
Bentler & Bonett's NFI	0.8939

Table 7 Fourth grade model based on table 15 corrections

Covariance structure analysis: Maximum likelihood estimation	
Goodness of fit index	0.9245
Bentler & Bonett's non-normed index	0.9504
Bentler & Bonett's NFI	0.8824

Table 3 Correlations of reading variables fourth grade urban (N = 121) rural (N = 76)

	Clp.	Prior.	Cont.	Dom.	CmNar.	Disc.	Strat.	PrEx.	CntEx.	DmEx.	CmpEx.	DscEx.	StrEx.
Clp.	1.00	0.368	0.288	0.479	0.469	0.244	0.398	0.148	0.268	-----	0.300	0.215	0.310
Prior.	0.160	1.00	0.283	0.310	0.549	0.234	*0.481	0.137	0.386	-----	0.316	0.186	0.311
Cont.	0.308	0.287	1.00	0.261	*0.242	0.122	0.165	0.221	0.180	-----	0.173	0.031	0.100
Dom.	0.333	0.333	0.373	1.00	0.465	0.222	0.383	0.084	0.450	---	0.402	0.236	0.335
CmNar.	0.483	0.481	*0.500	0.607	1.00	0.362	*0.648	0.150	0.437	-----	0.508	0.348	0.436
Disc.	0.055	0.253	0.370	0.384	0.555	1.00	0.337	0.005	0.281	-----	0.311	*0.406	0.365
Strat.	0.161	*0.187	0.062	0.375	*0.419	0.385	1.00	0.057	*0.445	-----	0.498	0.333	*0.582
Pr Ex.	-----	-----	-----	-----	-----	-----	-----	1.00	0.373	-----	0.309	0.161	0.340
CntEx.	0.317	0.184	0.221	0.356	0.307	0.242	*0.148	-----	1.00	-----	0.407	0. 248	0.390
DmEx.	0.234	0.313	0.214	0.427	0.435	0.149	0.240	-----	0.257	1.00	-----	-----	-----
CmpEx.	0.252	0.267	0.324	0.440	0.480	0.320	0.409	-----	0.200	0.361	1.00	0.440	*0.692
DscEx.	0.162	-0.038	0.156	0.285	0.231	*0.103	0.210	-----	0.074	0.433	0.187	1.00	0.472
StrEX.	0.228	0.188	0.002	0.264	0.345	0.293	*0.226	-----	0.206	0.304	*0.159	0.357	1.00
Std Dv. Urban	1.18	4.04	3.29	2.11	3.63	2.98	3.72	1.23	1.23	-----	3.76	2.32	3.52
Mean Urban	3.24	8.93	7.81	5.98	19.40	9.17	18.75	2.04	2.53	-----	16.14	12.80	16.98
Std Dv. Rural	1.45	2.44	1.06	2.29	4.61	2.09	1.31	-----	2.13	1.99	2.15	2.62	1.10
Mean Rural	8.24	3.70	18.29	11.57	17.21	5.47	2.50	-----	11.26	7.68	6.07	7.66	2.54

* Indicates significant difference between upper and lower triangle correlations at $p < .05$

Upper half of the leading diagonal = urban sample, lower half = rural sample

Table 4 Correlations of reading variables fifth grade urban (N = 134) rural (N = 62)

	Prior.	Cont.	Dom.	CmNar.	Disc.	Strat.	Pr.Ex.	CntEx.	DmEx.	CmpEx.	DscEx.	StrEx.
Prior.	1.00	*0.192	*0.097	*0.308	*0.144	0.312	0.196	*0.110	-----	*0.087	0.174	0.106
Cont.	*0.517	1.00	*0.009	*0.083	*0.092	*0.039	*0.181	*0.117	-----	0.072	0.121	*0.072
Dom.	*0.452	*0.397	1.00	0.261	0.206	0.377	0.095	*0.231	-----	0.181	0.206	0.165
ComLit.	*0.597	*0.667	0.464	1.00	*0.332	0.377	0.279	0.141	-----	0.367	0.242	0.297
Disc.	*0.582	*0.623	0.389	*0.611	1.00	0.235	0.141	*0.180	-----	*0.216	0.201	0.188
Strat.	0.320	*0.450	0.346	0.519	0.382	1.00	0.250	*0.087	-----	0.278	0.337	0.332
Pr Ex.	0.292	*0.248	0.212	0.314	0.384	0.250	1.00	0.297	-----	0.089	0.194	0.124
CntEx.	*0.435	*0.714	*0.454	0.660	*0.559	*0.414	0.289	1.00	-----	0.186	0.189	0. 198
DmEx.	0.230	0.254	0.273	0.454	0.380	0.199	0.084	0.379	1.00	-----	-----	-----
CmpEx.	*0.382	0.358	0.108	0.317	*0.487	0.453	0.284	0.265	0.278	1.00	*0.135	0.261
DscEx.	0.277	0.389	0.214	0.362	0.356	0.291	0.108	0.357	0.434	*0.457	1.00	*0.188
StrtEX.	0 341	*0.433	0.123	0.401	0.447	0.334	0.162	0.306	0.399	0.510	*0.784	1.00
Std Dv. Urba .	0.89	0.62	1.40	4.01	1.52	2.54	1.00	1.18	-----	2.67	2.68	22.97
Mean Urban	4.25	4.61	8.73	19.26	3.09	15.18	2.46	3 13	-----	16.63	13.61	26.28
Std Dv. Rural	0.95	2.46	1.32	4.27	2.27	1.26	0.94	2.29	1.87	1.41	1.77	1.50
Mean Rural	4.10	17.19	7.06	17.94	12.03	3.27	4.00	11.84	7.73	1.94	3.92	3.03

* indicates significant differences between upper and lower triangle correlations at p< .05
Upper half of the leading diagonal = urban sample, lower half = rural sample

Table 8 Fifth grade original model

Covariance structure analys	Maximum likelihood estimation
Goodness of fit index	0.9227
Bentler & Bonett's non-normed index	0.6915
Bentler & Bonett's NFI	0.7237

Table 9 Fifth grade model based on corrections

Covariance structure analysis: maximum likelihood estimation	
Goodness of fit index	0.9193
Bentler & Bonett's non-normed index	0.8563
Bentler & Bonett's NFI	0.7251

Table 10 Rural fourth grade model based on urban beta weights

Covariance structure analysis: Maximum likelihood estimation	
Goodness of fit index	0.7155
Bentler & Bonett's non-normed index	0.3668
Bentler & Bonett's NFI	0.3230

Table 11 Rural fourth grade model based on urban model without beta weights

Covariance structure analysis: Maximum likelihood estimation	
Goodness of fit index	0.8252
Bentler & Bonett's non-normed index	0.5048
Bentler & Bonett's NFI	0.6558

Table 12 Corrected rural fourth grade model based on urban model without beta weights

Covariance structure analysis: Maximum likelihood estimation	
Goodness of fit index	0.9159
Bentler & Bonett's non-normed index	0.9710
Bentler & Bonett's NFI	0.8403

Table 13 Rural fifth grade model based on urban beta weights

Covariance structure analysis: Maximum likelihood estimation	
Goodness of fit index	0.8848
Bentler & Bonett's non-normed index	0.4598
Bentler & Bonett's NFI	0.3961

Table 14 Rural fifth grade model based on urban model without beta weights

Covariance structure analysis: Maximum likelihood estimation	
Goodness of fit index	0.7545
Bentler & Bonett's non-normed index	0.5060
Bentler & Bonett's NFI	0.6751

Table 15 Corrected rural fifth grade model based on urban model without beta weights

Covariance structure analysis: Maximum likelihood estimation	
Goodness of fit index	0.9079
Bentler & Bonett's non-normed index	0.9735
Bentler & Bonett's NFI	0.8956

Figure 3 Fourth grade urban reading model

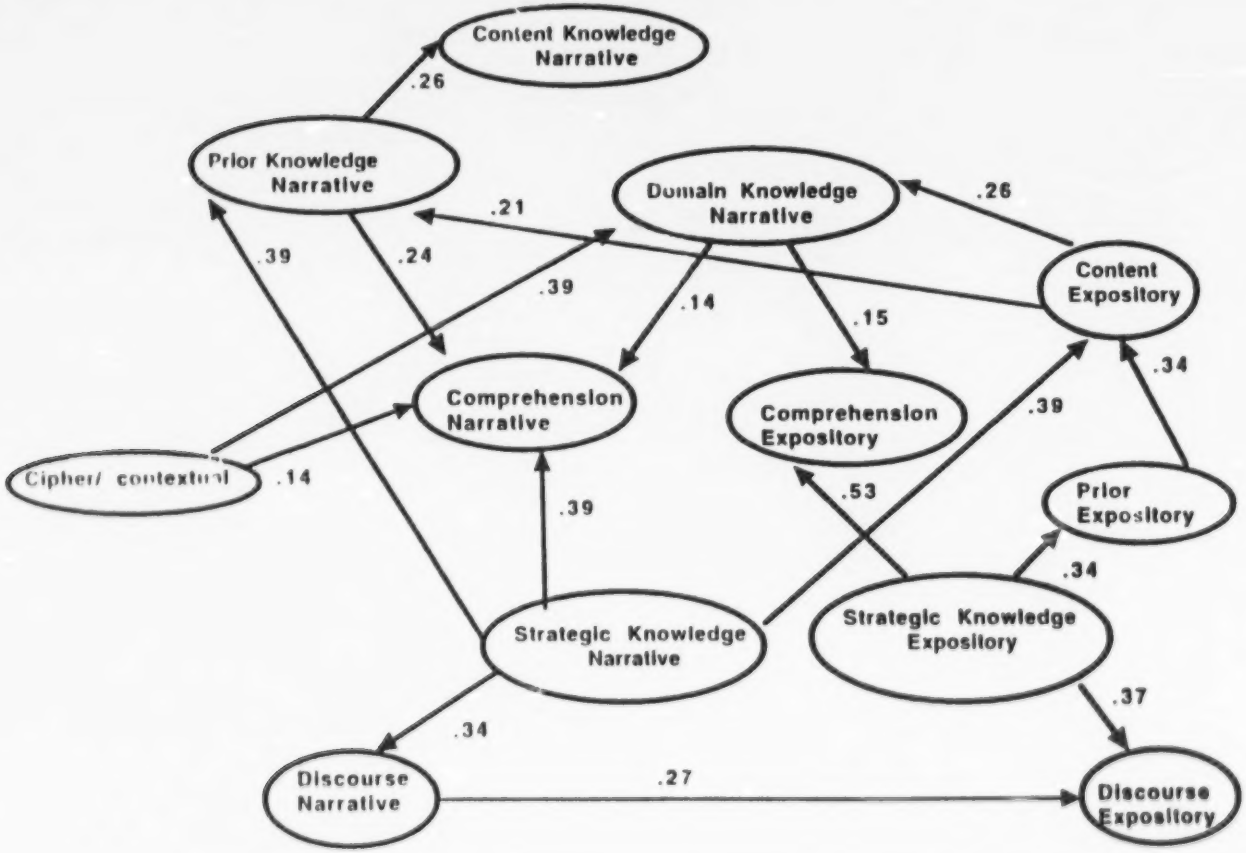

Figure 4 Fifth grade urban reading model

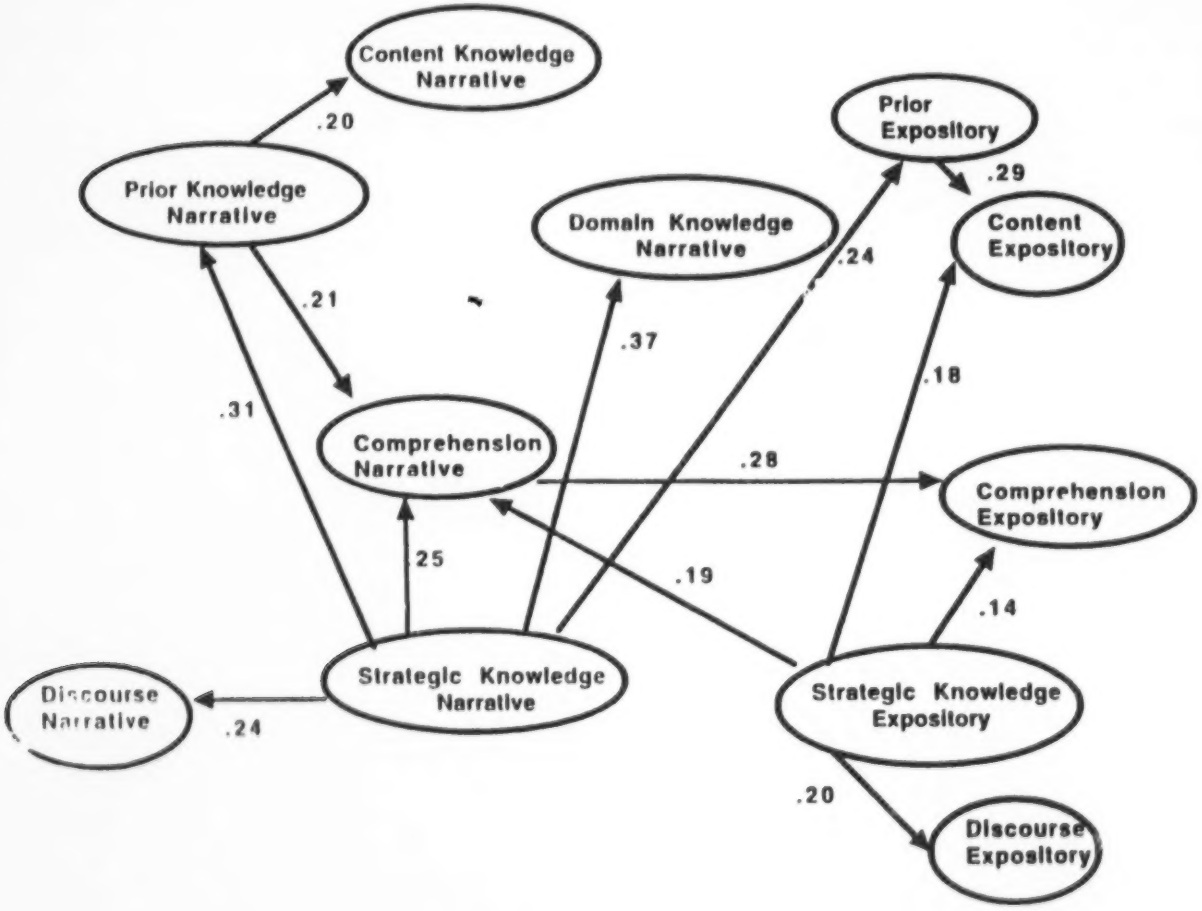

Figure 5 Fourth grade rural reading model

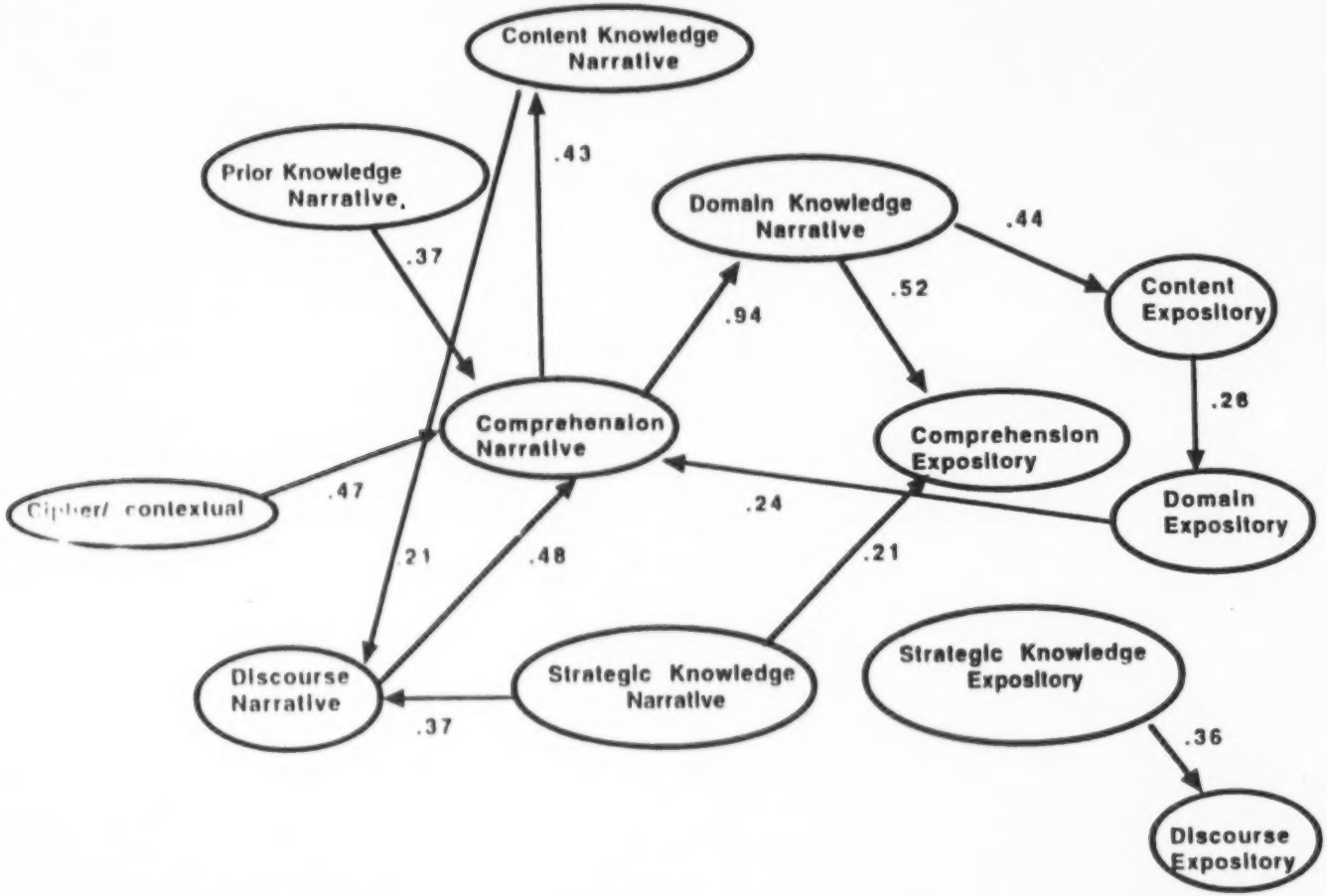

Figure 6 Fifth grade rural reading model